CLAIMS

1. A method of delivering ultrasound signals using shear waves, the method comprising applying a portion of at least a first ultrasound beam to a subject at at least a first incident angle relative to the surface of the subject to induce shear waves in the subject, energy in the shear waves forming a substantial part of energy of first ultrasound waves at a desired region in the subject at a therapeutic level.

2. The method of claim 1 wherein the portion of the first ultrasound mainbeam is applied to a surface of the subject between a longitudinal wave critical angle associated with the subject and a shear wave critical angle associated with the subject.

3. The method of claim 1 wherein applying the portion of at least a first ultrasound beam comprises applying ultrasound energy at multiple incident angles between the longitudinal wave critical angle associated with the subject and the shear wave critical angle associated with the subject to focus ultrasound energy in the desired region.

4. The method of claim 1 further comprising:

applying at least a portion of a second ultrasound beam to the subject the subject to induce shear waves in the subject and to produce second ultrasound waves in the subject at the desired region;

producing an image of at least a portion of the desired region; and

identifying, from the image, whether ultrasound energy from the portion of the second ultrasound beam reaches the desired region in a desired manner.

5. The method of claim 1 wherein applying the portion of at least a first ultrasound beam comprises applying the portion of at least a first ultrasound beam to bone.

6. The method of claim 5 wherein the bone is a skull, and wherein the portion of the first ultrasound beam is directed at the skull at the at least a first incident angle in order to reach the desired region within the skull.

7. The method of claim 1 wherein the portion of at least a first ultrasound beam is applied in multiple bursts of different frequencies.

8. The method of claim 7 wherein the different frequencies are within a range of frequencies from about 0.1MHz and about 5MHz.

9. The method of claim 7 wherein the different frequencies are within a range of frequencies from about 0.2MHz and about 3MHz.

10. The method of claim 7 wherein the pulses have durations within a range of about 1 cycle to continuous wave.

11. The method of claim 1 wherein applying the portion of at least a first ultrasound beam comprises applying a portion of a third ultrasound beam to the subject to produce shear waves in the subject to produce third ultrasound shear waves in the desired region.

12. The method of claim 11 wherein the portion of the third ultrasound beam is separate from the portion of the first ultrasound beam.

13. The method of claim 1 wherein applying the portion of at least a first ultrasound beam comprises applying a portion of a fourth ultrasound beam to the subject at a fourth incident angle that is less than the longitudinal wave critical angle associated with the subject.

14. A system for delivering ultrasound signals to a target region in a subject using

shear waves, the system comprising:

a source configured to transmit ultrasound energy; and

directing means, coupled to the source, for causing a portion at least a first mainbeam of the transmitted ultrasound energy to be incident upon a surface of the subject to induce shear waves in the subject, energy in the shear waves forming a substantial part of energy of first ultrasound waves at the target region in the subject at a therapeutic level.

15. The system of claim 14 wherein the directing means is configured to direct the first mainbeam at the surface of the subject at a first angle between a longitudinal critical angle associated with the subject and a shear critical angle associated with the subject.

16. The system of claim 15 wherein the directing means comprises at least one of (1) a positioner configured to mechanically direct a normal direction associated with the source toward the surface at the first angle, and (2) a phase/delay adjuster, wherein the source comprises a plurality of radiating elements, the phase/delay adjuster being configured to regulate at least one of phases and delays of the plurality of radiating elements to electronically steer at least the first mainbeam.

17. The system of claim 16 wherein the positioner is configured to at least one of (1) couple to the subject and the source in a fixed manner such that the normal is directed toward the surface at the first angle, and (2) mechanically adjust the source such that the normal is directed toward the surface at the first angle.

18. The system of claim 16 wherein the source comprises a plurality of elements configured to radiate ultrasound energy, the system comprising a controller configured and coupled to cause at least a portion of the source to emit ultrasound energy, to process indicia of reflected energy due to the emitted energy to determine an orientation of at least a portion of the surface relative to the source, and to actuate only elements of the source that have their

mainbeams at least partially directed at the portion of the surface between the longitudinal critical angle and the shear wave critical angle.

19. The system of claim 18 wherein the controller is configured to process the indicia of reflected energy to form an image of the at least a portion of the surface.

20. The system of claim 15 comprising a controller coupled to the source and configured to actuate the source to produce the first mainbeam and a second mainbeam at least a portion of which would be incident upon a surface of the subject at a second angle between the longitudinal critical angle associated with the subject and the shear critical angle associated with the subject such that ultrasound energy in the second mainbeam from the source will induce shear waves in the subject and energy from the second mainbeam will reach target region, wherein the second angle is different from the first angle.

21. The system of claim 14 comprising a controller coupled to the source and configured to actuate the source to produce the first mainbeam for transmitting energy to the target region.

22. The system of claim 14 comprising a controller coupled to the source and configured to actuate the source to produce the first mainbeam in a plurality of pulses with different frequencies.

23. The system of claim 22 wherein the different frequencies are within a range of frequencies from about 0.1MHz and about 5MHz.

24. The system of claim 23 wherein the different frequencies are within a range of frequencies from about 0.2MHz and about 3MHz.

25. The system of claim 22 wherein the pulses have durations within a range of about 1 cycle to continuous wave.

26. The system of claim 14 comprising a controller coupled to the source and configured to actuate the source to produce the first mainbeam and a third mainbeam at least a portion of which would be incident upon a surface of the subject at a third angle that is less than the longitudinal critical angle associated with the subject.

27. A system for delivering ultrasound signals to a target region in a subject using shear waves, the system comprising:

a source configured to transmit ultrasound energy;

a controller coupled to the source and configured to actuate the source to transmit ultrasound energy toward the subject; and

a positioning device coupled to the source and configured to ensure that a portion of a first mainbeam from at least a portion of the source is directed at a portion of a surface of the subject at a first angle between a longitudinal critical angle associated with the subject and a shear critical angle associated with the subject such that ultrasound energy in the first mainbeam will induce shear waves in the subject and energy from the transmitted ultrasound will reach the target region;

wherein the controller is configured to cause the source to transmit energy in a plurality of pulses, with each pulse having a different frequency.

28. The system of claim 27 wherein the source comprises a plurality of elements configured to transmit ultrasound energy, and wherein the controller is configured to inhibit actuation of at least one of (1) a portion of the source configured to produce a second mainbeam at least a portion of which would be incident upon the portion of the surface of the subject at a second angle that is less than the longitudinal critical angle, and (2) a portion of the source configured to produce a third mainbeam at least a portion of which would be incident upon the

portion of the surface of the subject at a third angle that is greater than the shear wave critical angle.

29. The system of claim 27 wherein the different frequencies are within a range of frequencies from about 0.1MHz and about 5MHz.

30. The system of claim 29 wherein the different frequencies are within a range of frequencies from about 0.2MHz and about 3MHz.

31. The system of claim 29 wherein the pulses have durations within a range of about 1 cycle to continuous wave.

32. The system of claim 27 wherein the positioning device is configured to couple to the subject to mechanically orient the source relative to the subject as desired.

33. The system of claim 27 wherein the source comprises a plurality of elements configured to transmit ultrasound energy, and wherein the positioning device is configured to affect phases of the elements to electronically steer the first mainbeam.